# Power spectrum analysis of near-infrared images of Venusian cloud distributions obtained by Galileo

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The dynamical structure of planetary atmosphere has a hierarchy of the spatial scale, such as micro-, meso-, and macro-scales. On the meso-scale turbulence in the Earth's atmosphere, the Kolmogorov's statistical law has been used to understand an energy input and its cascade process. However, the meso-scale dynamics in other planets has not been understood well due to the limitation of spatial resolution of observations.

In order to clarify the dynamics of meso-scale turbulence in the Venusian atmosphere, we examined the power spectra of Venusian cloud images obtained by the near-infrared spectrometer (NIMS) onboard the Galileo spacecraft during the Venus fly-by in 1990, assuming that the cloud pattern seen in the near-infrared image corresponds to the kinetic energy or the wind velocity. Galileo/NIMS observed the nightside image of Venusian disk in the range from 700 to 5200nm with a spatial resolution of about 25 km. Cloud patterns at the bottom of cloud deck (50 km) and the cloud top (70 km) are derived from 2300nm and 4600nm image data, respectively.

From the power spectra of cloud images, it is found that gradients of spectra estimated both in the bottom of cloud deck and the cloud top agreed well with a power of –5/3. This fact suggests that an energy dissipation process is dominant on the meso-scale turbulence in both altitude ranges. It is also found that there is no significant difference among power spectra estimated from image data for the equatorial, mid-low latitude regions in the northern and southern hemispheres. In this presentation, we will make comparison between these results and previous results obtained from Galileo/SSI UV image data.